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INTENSIVE TREATMENT NEAR THE END OF LIFE IN ADVANCED CANCER PATIENTS

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ABSTRACT

Touza, Kaitlin Kyna. M.S., Purdue University, May, 2016. Intensive Treatment Near the End of Life in Advanced Cancer Patients. Major Professor: Kevin L. Rand.

Many advanced cancer patients receive intensive treatment near the end of life (EOL). Intensive treatment near the EOL is often associated with worse outcomes, such as worse quality of life (QOL), greater distress in patients and caregivers, and higher health care costs. For cancers typically unresponsive to chemotherapy such as lung and gastro-intestinal (GI), the side effects of intensive treatment are endured without increasing survival time. To date, research on EOL care in advanced cancer patients has focused on patient prognostic understanding, physician communication, and patient distress. These factors do not fully explain why many patients receive intensive treatment near the EOL when there is no hope for cure. Hence, there is a need to better understand the factors that influence EOL treatment in order to improve patient and caregiver outcomes. Self-Regulation Theory (SRT) provides a framework that may help explain motivations and care decisions in this population. This study had two aims: 1) to examine the associations between EOL clinical encounters (i.e., EOL conversations with a physician) and treatment intensity in advanced cancer patients near the EOL; and 2) to examine the associations between important SRT constructs (i.e., goal flexibility, hope,

and optimism) and treatment intensity in advanced cancer patients near the EOL. A sample of 76 advanced lung and GI cancer patients was recruited from Indiana University Simon Cancer Center. Hope predicted receiving chemotherapy closer to death (β = -.41, t (66) = -2.31, p = .025), indicating more intensive treatment near EOL. Other predictor variables were not significantly associated with intensive treatment. Implications and methodological limitations are discussed.

INTRODUCTION

When treating advanced cancer, physicians and patients must balance the pros and cons of intensive, survival-focused treatments versus symptom-directed treatments. Survival-focused treatments may prolong life but will likely limit functional status and reduce quality of life (QOL; Kypriotakis, Vidrine, Francis, & Rose, 2015). For example, the selection of chemotherapy involves a tradeoff between possible life prolongation and undesirable side effects (i.e., fatigue, pain, and gastro-intestinal [GI] changes; Emanuel et al., 2003). In contrast, symptom-directed treatments (i.e., palliative care) optimize QOL and function, but are thought to be associated with shortened survival (Kypriotakis et al., 2015). However, there is evidence that early use of symptom-directed treatment actually *increases* survival time in patients with certain types of advanced cancer (Connor et al., 2007; Kypriotakis et al, 2015; Scibetta, Kerr, Mcguire, & Rabow, 2015; Weeks et al., 1998). Further, for typically unresponsive cancers (i.e., lung and GI cancers), intensive survival-focused treatments are associated with worse patient and caregiver QOL and greater caregiver distress and bereavement than symptom-directed treatments (e.g., palliative care and hospice; Leung et al., 2010; Martoni et al., 2007; Wright et al., 2008). Nonetheless, more than one-fifth of advanced lung and GI cancer patients forgo symptom-directed treatment and receive intensive treatment in the last three months of life (Earle et al., 2004; Emanuel et al., 2003; Martoni et al., 2007; McCarthy et al., 2003).

Advanced Lung and Gastrointestinal Cancer

Advanced lung and GI cancer patients warrant specific attention in end of life (EOL) treatment trends due to the typical unresponsiveness of these cancers to chemotherapy and the high rate at which they occur (Braga et al., 2007; Emanuel et al., 2003; Temel et al., 2008). In 2015, lung cancer accounted for between 13% and 14% of new cancers, and GI cancer 8%, making them the second and third most common cancers in the United States (American Cancer Society [ACS], 2015). Lung cancer accounted for more deaths than any other cancer (27% of cancer deaths), and GI cancer was the third most common killer (8 - 9% of cancer deaths) in 2015 (ACS, 2015). Only 15% of lung and 40% of GI cancer cases are diagnosed at a localized stage (i.e., before metastasis to distant organs; ACS, 2015). Long-term survival rates for these cancers decline dramatically when diagnosed at a later stage (ACS, 2015), making it important for physicians to discuss EOL and treatment outcomes with late stage patients.

With the failure of first-line chemotherapies, advanced cancer patients will often go on to receive second- and third-line chemotherapies in their last months of life. Unfortunately for lung and GI cancers, subsequent chemotherapy regimens show poor response rates of less than 10%, and the likelihood of successful treatment declines with each additional chemotherapy regimen (Braga et al., 2007; Temel et al., 2008). A prospective study examined a population of advanced non-small cell lung cancer (NSCLC) patients (N=40) and found that 30% of patients had started a new chemotherapy regimen in the last month of life (Temel et al., 2008).

Intensive Treatment Near End of Life in Advanced Cancer

Commonly, the period of one to three months before death is defined as being near EOL (Braga et al., 2007; Earle et al., 2003, 2008; Grunfeld et al., 2006; Martoni et al., 2006; Temel et al., 2008). The most commonly used indicators of intensive treatment during this time period are: 1) number of ER visits; 2) number and duration of ICU admissions; 3) number and duration of hospitalizations; 4) time between death and hospice enrollment; 5) time between death and last chemotherapy administration; 6) time between death and most recent new chemotherapy regimen start; and 7) occurrence of intubation, tube feeding, or cardiopulmonary resuscitation (CPR; Braga et al., 2007; Earle et al., 2003, 2008; Martoni et al., 2006; Temel et al., 2008).

The use of intensive treatment near EOL in advanced lung and GI cancers is concerning as survival-focused treatments are not consistently associated with greater survival time when compared to symptom-directed therapies (Connor, Pyenson, Fitch, Spence, & Iwaski, 2007; Mack et al., 2010). Weeks and colleagues (1998) examined prognostic understanding and treatment preferences in 917 advanced NSCLC patients and found that 6-month survival was no different for those who chose survival-focused treatment versus symptom-directed treatment. Kypriotakis and colleagues (2015) examined QOL as a predictor of survival in 512 advanced cancer patients with a median life expectancy of 14.2 months or less. Lung and GI cancer patients made up 58.7% of the sample. Counterintuitively, receipt of chemotherapy was associated with a 53% increased risk of dying within 24 months and better QOL predicted greater survival time. In a study of 4,493 terminally ill patients, Connor and colleagues (2007) found that patients enrolled in hospice survived a mean of 29 days longer than those not enrolled in

hospice. However, their sample included congenital heart failure patients, demonstrating the need to examine hospice versus non-hospice survival in cancer patients specifically.

Patients are typically eligible for hospice enrollment when they are deemed terminally ill with a life expectancy of 6 months or less (Hospice Care, n.d.), but many advanced cancer patients are not enrolled in hospice until they are within days of death (Chen et al., 2003; McCarthy et al., 2003). The decision to forgo hospice predicts greater depression, prolonged grief disorder, and lower QOL in caregivers (Chen et al. 2003; Mack et al., 2010; Wright et al. 2008; Wright et al. 2010). In a study examining barriers to hospice enrollment among advanced lung and colorectal cancer (CRC) patients McCarthy and colleagues (2003) identified male gender, having non-Preferred Provider Organization (PPO) insurance, and living in a rural area as barriers. Chen and colleagues (2003) found multiple factors associated with hospice enrollment in advanced cancer patients, including age, education, household size, prognostic understanding, comorbid disease, and hospice discussion with a physician. Underutilization of hospice is concerning in advanced cancer as the findings of Kypriotakis and colleagues (2015) suggest QOL has an impact on overall survival time.

Also of concern for patients and caregivers is the greater health care cost associated with intensive treatment near EOL and late hospice enrollment (Scibetta et al., 2015; Zhang et al., 2009). Early referral and receipt of symptom-directed treatment (i.e., hospice) is associated with significantly lower health care costs and less emergent care use in the last month of life (Scibetta et al., 2015).

Factors Associated with End of Life Treatment in Advanced Cancer

The care that patients receive near EOL is influenced by several factors, such as physician communication of terminal status, patient prognostic understanding, family status, affect, and age (Chen, Haley, Robinson, & Schonwetter, 2003; Fujisawa et al., 2015; Mack et al., 2010; McCarthy et al., 2003; Weeks et al., 1998). Patients with inaccurate prognostic understanding (i.e., belief that cure is possible) are more likely to receive intensive treatment (Evans, Rasman, Deeg, & Onwuteaka-Philipsen, 2014; Haidet et al., 1998; Weeks et al., 2012). Yet even advanced cancer patients with accurate prognostic understanding and knowledge of their terminal status may still choose to receive intensive treatment near EOL, and previously-studied patient and physician factors do not explain why (Mack, Weeks, Wright, Block, & Prigerson, 2010).

Patients who discuss prognosis with their physician (i.e., have an EOL clinical encounter) may be less likely to receive intensive treatment near EOL (Ahluwalia et al., 2015; Loggers et al., 2013; Zhang et al., 2009). Ahluwalia and colleagues (2015) examined EOL clinical encounters as predictors of treatment intensity near EOL in advanced cancer patients. They found that patients who had early EOL clinical encounters (i.e., within the first month of diagnosis) were less likely to receive emergent care in their last month of life. Zhang and colleagues (2009) similarly found that advanced cancer patients who reported having an EOL clinical encounter were less likely to receive emergent care and had lower health care costs in their last week of life. In a study of 292 advanced cancer patients, Loggers and colleagues (2013) found that patients who reported an EOL clinical encounter did not receive emergent care near EOL. The results from these studies suggest EOL clinical encounters may result in less use of

emergent care near EOL. However, Ahluwalia and colleagues (2015) specifically examined EOL clinical encounters as predictors of chemotherapy use. They found that EOL clinical encounters were unrelated to use of chemotherapy. Also, Loggers and colleagues (2013) and Ahluwalia and colleagues (2015) found EOL clinical encounters to be unrelated to hospice care. The ability of EOL clinical encounters to predict treatment intensity near EOL should be further explored.

The inconsistent ability of EOL clinical encounters to predict treatment intensity may be explained by inaccurate prognostic understanding. Even with physician- and patient-reported EOL clinical encounters, patients often overestimate the likelihood of long-term survival and misunderstand the goal of treatment as cure rather than life prolongation (Chen et al. 2003; El-Jawahri et al., 2014; Haidet et al., 1998; Weeks et al. 1998; Weeks et al., 2012). Haidet and colleagues (1998) surveyed 520 CRC patients and their doctors in a prospective study examining patient preferences for EOL conversations, prognostic understanding, and treatment preferences. They discovered that EOL conversations did not improve the accuracy of patient-reported prognosis or physician understanding of patients' EOL treatment preferences (e.g., preferences for CPR). Weeks and colleagues (1998) identified a relationship between patients' survival estimates and preferences for treatment in NSCLC and CRC patients, such that patients with a more optimistic attitude toward prognosis preferred survival-focused treatment. In a recent study, Weeks and colleagues (2012) surveyed 1,193 advanced lung and CRC patients to examine their understanding of treatment goals and prognosis. They found that even with patient-reported EOL clinical encounters with physicians, most patients (69% of lung cancer patients and 81% of CRC patients) incorrectly believed the goal of treatment was

cure. Similarly, El-Jawahri and colleagues (2014) showed that 54% (N=50) of patients with advanced cancer believed that their cancer was likely to be cured.

Advanced cancer patients' predictions of survival time may guide their treatment choices. Weeks and colleagues (1998) examined predicted survival time in 917 advanced NSCLC and CRC patients and their treatment preferences. Patients were more optimistic about their survival than their physicians, with 59% of the patient sample estimating a 90% chance of surviving six months. Optimistic survival estimates did not predict actual survival time. At six-month follow-up only 57% of these high estimators were still alive. Further, patients who were more optimistic about their predicted survival time were more likely to choose survival-focused treatment. Such attitudes about survival time and likelihood of successful treatment may be explained by optimistic bias, or the tendency for people to rate their own risk for negative outcomes as lower than that of others (Gouveia, & Clarke, 2001). Beyond general optimistic bias, there is a culture surrounding cancer that strongly encourages hopeful and optimistic attitudes in patients, with the expectation that optimistic outlooks may positively impact treatment outcomes (Sulmasy et al., 2010). However, in cases where cure is not possible, hopeful and optimistic attitudes about survival may lead to worse outcomes.

Hopeful and optimistic attitudes toward survival and cure are likely due to multiple physician and patient factors (Hagerty et al., 2004; Haidet et al., 1998). Physicians may be unwilling or uncomfortable relating prognostic information to patients with no chance of cure, such that they use overly optimistic language or avoid the discussion until death is imminent (Gattellari, Voigt, Butow, & Tattersall, 2002; Hagerty et al., 2004; Haidet et al., 1998; Weeks et al., 2012). In an Australian study examining

EOL clinical encounters with physicians in 118 advanced cancer patients, Gattellari and colleagues (2002) found that only 75% of patients had been informed that their disease was incurable, 58% had been told about life expectancy, 44% were presented with treatment options alternative to survival-focused treatment, only 36% were informed of how survival-focused treatment would impact QOL, and understanding was assessed with only 10% of patients. Factors such as affect may impact patient readiness to engage in EOL discussions. Hagerty and colleagues (2004) examined patient differences in preferences for prognostic information. They noted that more depressed patients were more likely to want information on average survival and shortest survival times without treatment. These findings imply that patients with less optimistic or hopeful outlooks are more open to addressing EOL issues and that there are patient and/or physician factors impacting care decisions beyond prognostic understanding. Such trends also highlight the importance of controlling for psychological distress in analyses of factors impacting patient treatment choice.

In patients who express accurate prognostic understanding, social factors, affect, and personality traits may influence their decision (El-Jawahri et al., 2014; Hagerty et al., 2004; Weeks et al., 1998). Mack and colleagues (2010) examined prognostic understanding in advanced cancer patients and their EOL treatment preferences. They found that among patients who had accurate understanding of their terminal diagnosis, 17% (N=121) wished to receive survival-focused treatment, suggesting patient personality traits might impact treatment beyond prognostic understanding. There is currently no theoretical framework explaining how personality may impact treatment near EOL in advanced cancer patients.

Self-Regulation Theory

Self-Regulation Theory (SRT) is an empirically supported model of human behavior that may help explain how patients choose care near EOL (Carver & Scheier, 1998). According to SRT, human behavior is driven by the pursuit of goals. SRT constructs (i.e., goal-related personality traits) may provide a first step in predicting advanced cancer patients' EOL treatment choices (Carver & Scheier, 1998).

SRT is based on expectancy-value models of motivation (Carver & Scheier, 1998). Goals are characterized by value and expectancy, such that the decision to pursue a goal is a function of the expectancy that a goal can be achieved and the value placed on its achievement (Carver & Scheier, 1998; Rasmussen, Wrosch, Scheier, & Carver, 2006). For goals with high value, the decision to pursue a goal may be maintained even if expectancy for success is low (Carver & Scheier, 1998). An advanced cancer patient's decision to pursue survival-focused treatment despite low expectancy of success and decreasing QOL may be explained by the high value of survival (Scheier & Carver, 2003).

Goal-Related Personality Traits

SRT posits that what goals are valued and pursued can be further influenced by goal-related personality traits, such as goal flexibility, hope, and optimism (Carver & Scheier, 1998). Goal flexibility is a two-part process in which a person disengages from goals when they become unattainable and reengages with new more achievable goals (Wrosch, & Scheier, 2003; Wrosch, Scheier, & Miller, 2013). The ability to disengage from unattainable goals is adaptive and has a positive impact on subjective well-being

(Wrosch et al., 2013), and greater goal flexibility is associated with less psychological distress (Carver & Scheier, 1998; Wrosch, Scheier, Miller, Schulz, & Carver, 2003; Wrosch et al., 2013).

Goal disengagement and reengagement appear to be distinct processes in that individuals differ in their ability to adjust their goals. Goal disengagement appears to protect against the experience of repeated failure in persisting toward an unattainable goal and relieve negative aspects of subjective well-being (e.g., negative affect). Goal reengagement appears to foster positive aspects of subjective well-being (e.g., positive affect) through the pursuit of new meaningful attainable goals (Wrosch et al., 2003; Wrosch et al., 2013; Wrosch & Sabiston, 2013).

No studies examining goal flexibility in the context of advanced cancer were discovered during the course of this research. While continuing to believe that cure is possible may be an indication of psychological well-being, SRT posits that the inability to progress toward a goal is a major cause of psychological distress such that limited goal flexibility and maintaining the goal of cure may lead to depressive symptoms (Carver & Sheier, 1998; Rasmussen et al., 2006; Wrosch et al., 2013). Patients higher in goal disengagement may be more likely to disengage from cure goals and receive less intensive treatment near EOL. Patients higher in goal reengagement may be more likely to pursue symptom-directed treatment as it may allow engagement in alternate goals, such as optimizing QOL.

Trait hope and optimism are also typically associated with positive health outcomes (Berg, Snyder, & Hamilton, 2008; Feldman & Sills, 2013; Snyder, Lehman, Kluck, & Monsson, 2006). However, how these personality traits impact EOL cancer

treatment has not been explored. Hope is defined as a person's perceived ability to achieve goals. It comprises two interrelated thought processes: 1) a person's belief in their ability to generate pathways to achieve a goal; and 2) a person's belief in their determination to use those pathways (Snyder, 2002). Optimism is the trait expectancy for positive outcomes (Scheier & Carver, 1985). It is the belief that good, as opposed to bad, things will happen in the future.

Hopeful and optimistic people have greater expectancy for positive outcomes in goal achievement and are more persistent in goal pursuits in the face of barriers (Carver & Scheier, 1998; Rasmussen et al., 2006). Snyder and colleagues (2005) demonstrated that hopeful people endure pain longer than less hopeful people. Geers, Wellman, Seligman, Wuyek, and Neff (2010) showed that greater optimism is associated with greater treatment adherence when patients rated their treatment goals as highly important. Trait hope and optimism may help explain why some advanced cancer patients persist in survival-focused treatment despite worsening QOL. Further, these traits may influence what treatment goals are perceived as attainable versus unattainable, potentially explaining why advanced cancer patients maintain the goal of cure.

High levels of hope and optimism may increase patients' expectancy of successful treatment, such that they pursue the goal of survival despite health decline (Weeks et al., 1998). In a survey of 73 NSCLC patients' attitudes toward hypothetical intensive chemotherapy regimens, most patients were willing to accept intensive chemotherapy despite only a small chance of cure or life prolongation (Hirose et al., 2008). This suggests a hopeful or optimistic bias in expectations for treatment success. Similarly, in Weeks and colleague's (1998) study of 917 advanced cancer patients, those who were

more optimistic about their six-month survival were more than twice as likely to favor survival-focused treatment.

Present Study

Why patients with incurable cancer often choose survival-focused treatment over symptom-directed treatment is not well understood (Chen et al. 2003; El-Jawahri et al., 2014; Haidet et al., 1998; Mack et al., 2010; McCarthy et al., 2003; Weeks et al. 1998; Weeks et al., 2012). EOL clinical encounters (e.g., EOL prognostic discussion with a physician) and goal-related personality traits (e.g., goal flexibility, hope, and optimism) may impact what treatment goals are valued, such as prolonging life or greater comfort near EOL. Goal flexibility, hope, and optimism have been shown to predict goal pursuit in heart disease, early stage breast cancer, multiple sclerosis, diabetes, and amputation, but the majority of this research focuses on recovery post treatment or coping with a chronic disease (Coffey, Gallagher, & Desmond, 2014; Madan & Pakenham, 2014; Rasmussen et al., 2006). There is currently no conceptual framework that explains how these factors impact treatment in advanced cancer patients. Understanding what factors play a role in choosing survival-focused treatment over symptom-directed treatment may help physicians to effectively communicate prognosis and treatment options and help patients to make informed health care decisions (Hagerty et al., 2004; Mack et al., 2010).

To date, research on EOL treatment in advanced cancer patients has largely focused on prognostic understanding, physician communication, and patient distress. These factors do not fully explain why many patients receive intensive treatment near EOL when there is no hope for cure. EOL clinical encounters and goal flexibility, hope,

and optimism may predict EOL treatment in advanced cancer patients. The purpose of the current study was to examine if EOL clinical encounters (i.e., EOL conversations with a physician) and SRT constructs (i.e. goal flexibility, hope, and optimism) predict intensity of treatment received near EOL in advanced cancer patients (Figure B1). I tested the following research questions and hypotheses:

Research Question 1: Do EOL clinical encounters (i.e., patient-reported EOL treatment goals conversations and evidence of EOL conversations in the medical record) predict intensity of treatment near EOL?

Hypothesis 1.1: Patient-reported EOL treatment goals conversation with a physician will predict less intensive treatment near EOL.

Hypothesis 1.2: Evidence of EOL conversation from medical records will predict less intensive treatment near EOL.

Research Question 2: Do patient personality traits (i.e., goal flexibility, hope, and optimism) predict intensity of treatment near EOL?

Hypothesis 2.1: Greater goal disengagement and goal reengagement will predict less intensive treatment near EOL.

Hypothesis 2.2: Greater hope and optimism will predict more intensive treatment near EOL.

METHOD

Study Design

This study used a longitudinal correlational design. Participants were tracked from consent (March 2010) until data collection was halted (February 2015). An electronic medical record (EMR) review was performed with deceased participants' records (Table A1). The outcome variable was use of intensive treatment. EOL clinical encounters (i.e., patient-reported EOL treatment goals conversations and evidence of EOL conversations from medical records) and personality traits (i.e., goal flexibility, hope, and optimism) were predictors, measured via EMR review and self-report survey. Survey measures and interview data were collected at the Indiana University Simon Cancer Center between March 2010 and July 2011. This project examined data from a larger study with the aim of examining relationships among goals, goal-related personality traits, situational factors, and health care decision-making. The study protocol was approved by the Institutional Review Board (IRB) of Indiana University – Purdue University Indianapolis (IUPUI).

Setting and Sample

Participants were recruited from the Indiana University Simon Cancer Center Thoracic Oncology and Gastrointestinal Oncology Clinics. Co-investigators and

attending oncologists screened clinic schedules for potentially eligible patients. Between March 2010 and July 2011, 170 potentially eligible patients were identified (Figure B2). Of these 170 patients, 17 were not given a study packet at their physician's discretion, the research assistant was unable to approach them before the recruitment window ended, or they were deceased. The remaining 153 patients were mailed a study invitation packet including an introduction letter, survey, and informed consent documents. Of these patients, 36 refused participation, 11 were deceased, and 22 were lost to follow-up, resulting in a sample size of 84. Potentially eligible participants were approached during a clinic visit to confirm eligibility and obtain informed consent. At the time data collection was halted in February 2015, 8 patients were alive and were excluded from the analyses. Of these remaining 76 participants, 70 completed survey measures and were included in the analyses.

Eligibility Criteria

Eligible patients had been diagnosed with advanced lung or GI cancer determined by histological confirmation of cancer, had clinical evidence of metastatic disease without option of curative resection, had an expected overall survival of less than 12 months, were enrolled within 8 weeks of diagnosis, were greater than 18 years of age, were English speaking, were able to provide informed consent, and were willing to complete study surveys. Consistent with the expected overall survival requirement, patients with GI cancers had to have previously received a first line chemotherapy at consent.

Measures

Participants were asked to fill out a self-report survey including measures of demographics, EOL clinical encounters, goal-related personality traits, and psychological distress.

Sample Characteristics

Participant demographics were assessed via self-report survey. Participants were asked to report their age, gender, race/ethnicity, education level, marital status, and insurance type (Table A2).

End of Life Clinical Encounters

An item on the survey assessed for patient-reported EOL treatment goals conversations, (e.g., "Have you and your oncologist discussed any particular wishes you have about the care you would want to receive if you were dying?"). EMR records were reviewed for evidence of EOL conversations with a physician.

Goal-Related Personality Traits

Hope was assessed using the Adult Hope Scale (AHS; Snyder et al., 1991), a 12-item self-report measure of trait hope (i.e., "Even when others get discouraged, I know I can find a way to solve a problem."). Responses range from "definitely false" to "definitely true" on an eight point Likert-type scale. Higher scores indicate greater levels of hope. The AHS showed good internal consistency in this sample (Cronbach's alpha = 0.84).

Optimism was assessed using the Life Orientation Test-Revised (LOT-R; Scheier, Carver, & Bridges, 1994), a10-item self-report measure of dispositional optimism (i.e.,

"In uncertain times, I usually expect the best."). Responses range from "strongly disagree" to "strongly agree" on a five point Likert-type scale. Higher scores indicate greater levels of optimism. The LOT-R is revised from the original LOT (Scheier & Carver, 1985). The LOT-R showed good internal consistency in this sample (Cronbach's alpha = 0.82).

Goal flexibility was assessed using the Goal Adjustment Scale (GAS; Wrosch et al., 2003), a 10-item measure of ability to disengage and re-engage with goals. Responses range from "almost never true" to "almost always true" on a five point Likert-type scale. The measure produces two subscales for goal disengagement (i.e., "I find it difficult to stop trying to achieve the goal.") and goal reengagement (i.e., "I put effort toward other meaningful goals."). The goal disengagement and goal reengagement subscales showed acceptable internal consistency in this sample (Cronbach's alpha = 0.64 and 0.94, respectively).

Covariates

Age, gender, distress, and performance status were controlled for in all analyses.

Psychological distress was measured using the Hospital Anxiety and Depression Scale (HADS), a widely used 14-item measure assessing anxiety (i.e., "I feel tense or 'wound up.'") and depression (i.e., "I feel as if I am slowed down.") in ill patients (Zigmond & Snaith, 1983). A total score can also be used to assess global distress (Marinez Lopez et al., 2012). The HADS uses a four point Likert-type scale (ranging from 0 to 3) with higher scores indicating more anxiety and depression. In this sample, the HADS had good internal consistency (Cronbach's alpha = 0.88).

Oncologists were asked to rate participants' functioning. The Eastern Cooperative Oncology Group (ECOG) Performance Status scale is used by doctors and researchers to assess how a patient's disease affects their daily living and self-care activities (i.e., "0 = Fully active, able to carry on all pre-disease performance without restriction."; Oken et al., 1982). Responses range from "fully active" to "dead" on a five-point scale. Physician responses were verified via EMR review.

Indicators of Intensive Treatment

EMR review was conducted to extract data on treatments received for each participant (i.e., between consent and death), treatments received near EOL (i.e., within 6 months of death), and evidence of EOL clinical encounters with a physician. Indicators of intensive treatment were defined based on prior research (Braga et al., 2007; Earle et al., 2004; Temel et al., 2008).

Dichotomous indicators for intensive treatment include: 1) more than one day spent in an intensive care unit (ICU)/emergency room (ER) and/or hospital within 30 days of death; 2) more than one admission to an ICU/ER and/or hospital within 30 days of death; 3) enrollment in hospice within 7 days of death; 4) chemotherapy administration within 30 days of death; and 5) new chemotherapy regimen start within 60 days of death (Table A3; Braga et al., 2007; Earle et al., 2004; Temel et al., 2008).

Continuous indicators of intensive treatment include: 1) days spent in an ICU/ER and/or hospital within 30 days of death; 2) number of ICU/ER and/or hospital admissions within 30 days of death; 3) days between hospice enrollment and death; 4) days between final chemotherapy administration and death; and 5) days between final chemotherapy

regimen start and death (Table A4; Earle et al., 2004; Temel et al., 2008). Evidence of less intensive treatment will be indicated by: 1) less use of emergent care within 30 days of death; 2) greater time spent in hospice care; 3) greater time between final chemotherapy administration and death; and 4) greater time between final chemotherapy regimen start and death; (Braga et al., 2007; Earle et al., 2004; Temel et al., 2008).

Procedure

Eligible participants were mailed an introduction packet, including an invitation letter, informed consent document, and surveys. Participants were then approached in clinic to confirm eligibility and obtain informed consent. Consent included access to medical records. EMR records were reviewed for deceased patients. Study surveys were completed by patients individually and returned to a research assistant during clinic visits. Indiana University Simon Cancer Center used two electronic medical record systems: Careweb and Indiana Network for Patient Care (INPC). Medical records in both databases were reviewed for each participant.

RESULTS

Data Cleaning

Continuous variables were examined for skewness and kurtosis (Table A4). The following outcome variables were positively skewed and leptokurtic: 1) total days inpatient in the ER/ICU and/or hospitalized within 30 days of death; 2) total number of admissions to the ER/ICU and/or hospitalized within 30 days of death; 3) days between hospice admission and death; 4) days between final chemotherapy administration and death; and 5) days between final chemotherapy regimen start and death. Zero order correlations between predictor and control variables are presented in Table A5.

Homoscedasticity was assessed via scatterplot. Hope, days spent on hospice, days between final chemotherapy administration and death, days between final chemotherapy regimen start and death, and days spent in an inpatient setting in the last 30 days of life contained outliers greater than three standard deviations from the mean. These outliers represented accurate values for medical record event data and were within the possible range of scores for the survey measures. The impact of these outliers was examined by Winsorizing them to three standard deviations (Ghosh & Vogt, 2012). Analyses were run twice, once with the Winsorized values and again with the non-transformed data. Winsorizing affected significance in the analysis examining personality traits as

predictors of days between final chemotherapy administration and death. Therefore, Winsorized data were used in all analyses.

Descriptive Analyses

Final analyses included 70 participants who had completed survey measures and had died before data collection was halted (Figure B2). Participant demographics are presented in Table A2. Participants survived a median 280 days from consent. Of these 70 participants who completed the survey, 8.5% reported having an EOL conversation with their physician, while 89.5% of medical records contained documentation of an EOL conversation (Table A3). Consenters were compared to patients who refused participation on age, race/ethnicity, gender, and cancer type. Patients who refused participation were significantly older than consenters (66.08 vs. 59.92 years; t (110) = 2.58, p = 0.011). There were no differences on race/ethnicity, gender, or cancer type.

Hospice enrollment or the decision to forgo enrollment was often not recorded in the medical record resulting in a large number of unknown cases. Because of this, the analyses examining hospice enrollment included only 42 participants. Analyses examining personality variables as predictors of days between the final chemotherapy administration or regimen start and death included 67 participants as 3 participants did not receive chemotherapy. One survey participant did not answer the question regarding patient-reported clinical encounters, as such analyses examining EOL clinical encounters as predictors of emergent care and chemotherapy use include one less participant.

Days spent in an ICU, ER, or hospital within 30 days of death were also poorly documented in that there was often unclear documentation of intake setting (i.e., ER or

ICU) and eventual release or transfer from the ER/ICU to inpatient hospitalization. These were also low frequency events. Therefore these variables were combined to create two composite variables: 1) total days spent in an emergent care setting within 30 days of death; and 2) total admissions to an emergent care setting within 30 days of death.

A substantial portion of the sample had an intensive treatment indicator near EOL. For dichotomous treatment related variables: 1) 38.2% of participants received intensive treatment; 2) 18.4% received chemotherapy within 30 days of death or started a new chemotherapy regimen within 60 days of death; and 3) 30.3% used emergent care within 30 days of death (Table A3). For continuous variables: 1) the mean days spent in the ER/ICU or hospitalized within 30 days of death was 2.39 (SD = 4.22); 2) the mean number of admissions to the ER/ICU within 30 days of death was .62 (SD = .78); 3) the mean days between hospice admission and death was 42.2 (SD = 70.25); 4) the mean days between last chemotherapy admission and death was 149.79 (SD = 209.76); 5) and the mean days between starting a new chemotherapy regimen and death was 240.36 (SD = 231.25; Table A4).

Hypothesis Testing

Research Question 1 Results

Research question one asked if EOL clinical encounters (i.e., EMR documented EOL conversations and patient-reported EOL treatment goals conversations) would predict intensity of treatment near EOL. Hypotheses 1.1 and 1.2 stated that the presence of an EOL clinical encounter (i.e., patient-reported or EMR documented, respectively) would predict less intensive treatment. To test these hypotheses three hierarchical logistic

regression analyses (Table A6) and five hierarchical linear regression analyses (Table A7) were performed (one regression for each indicator of treatment intensity). Age, gender, performance status, and distress were controlled for in all analyses.

In all three logistic regressions, EOL clinical encounters did not predict treatment intensity. Neither patient-reported EOL goals conversations nor EMR documented EOL conversations predicted: 1) treatment intensity (Table A10); 2) receiving chemotherapy within 30 days of death and/or starting a new chemotherapy regimen within 60 days of death (Table A11); or 3) use of emergent care within 30 days of death ($p > .05$; Table A12). Performance status had a significant positive relationship with both treatment intensity (Table A10) and emergent care use within 30 days of death ($p = .049$ and $p = .027$, respectively; Table A12). With each level increase in performance status, patients were 2.43 times more likely to receive intensive treatment and 3.06 times more likely to use emergent care within 30 days of death. Other control variables did not have a significant relationship with the outcome variables in these analyses ($p > .05$).

Next, a series of five linear regressions was performed to examine whether EOL clinical encounters predict various indicators of treatment intensity (Table A7). EOL clinical encounters were not significant predictors of intensive treatment in these five analyses. Neither patient-reported EOL goals conversations nor EMR documented EOL conversations were significantly related to: 1) total days spent in an emergent care setting (i.e., in an ER/ICU and/or hospital) within 30 days of death (Table A13); 2) total admissions to an emergent care setting within 30 days of death (Table A14); 3) days on hospice (Table A15); 4) days between the final chemotherapy administration and death (Table A16); or 5) days between the final chemotherapy regimen start and death (Table

A17; $p > .05$). Gender was a significant predictor of total days in an inpatient setting in the last 30 days of life, such that women spent an average of 1.90 more days inpatient than men during this period ($p = .045$; Table A13). Gender trended toward significance in predicting total inpatient admissions in the last 30 days of life ($p = .057$; Table A14), also indicating greater treatment intensity for women. Other control variables were not significantly related to outcomes ($p > .05$).

Research Question 2 Results

Research question two asked if goal-related personality traits would predict treatment intensity near EOL. Hypothesis 2.1 stated that higher levels of goal disengagement and goal reengagement would predict less intensive treatment. Hypothesis 2.2 stated that higher levels of hope and optimism would predict more intensive treatment. To test these hypotheses, three hierarchical logistic regression analyses (Table A8) and five hierarchical linear regression analyses (Table A9) were performed (again, one regression for each indicator of treatment intensity). Age, gender, ECOG status, and distress were controlled for in all analyses.

Goal-related personality traits were not significant predictors of: 1) dichotomous treatment intensity (Table A18); 2) receiving chemotherapy within 30 days of death and/or starting a new chemotherapy regimen within 60 days of death (Table A19); or 3) use of emergent care within 30 days of death ($p > .05$; Table A20). However, performance status had a noticeable effect size in predicting dichotomous treatment intensity (Odds Ratio = 2.20) and use of emergent care within 30 days of death (Odds

Ratio = 2.64) and trended toward significance in these analyses (p = .086 and p = .062, respectively).

For the first linear regression analysis, goal-related personality traits were examined as predictors of total days spent in an emergent care setting (i.e., in an ER/ICU and/or hospital) within 30 days of death (Table A21). Hope, optimism, and goal disengagement were not significant predictors of inpatient days (p > .05). Goal reengagement did have a significant positive relationship with the emergent care variable such that a one point increase in goal reengagement corresponded to .30 more days spent in an inpatient setting within 30 days of death, β = .38, t (70) = 2.54, p = .014. Optimism had a noticeable effect size in this analysis (β = -.31) and trended toward significance (p = .051). The control variables, age, gender, ECOG status, and distress, were not significantly related to the outcome (p > .05).

In the second linear regression, goal-related personality traits were used to predict total inpatient admissions within 30 days of death (Table A22). Personality traits were not significant predictors of inpatient admissions (p > .05). However, goal reengagement trended toward significance (p = .083). Control variables were not significantly related to the outcome (p > .05).

The third linear regression examined goal-related personality traits as predictors of days spent on hospice (Table A23). None of the personality traits or control variables were related to days on hospice (p > .05).

In the fourth linear regression, which examined goal-related personality traits as predictors of days between final chemotherapy administration and death, hope was significantly related to the outcome (Table A24). For each one point increase in hope,

participants had an average of 8.98 fewer days between their last chemotherapy administration and death, β = -.41, t (67) = -2.31, p = .025. Other personality variables and controls were not related to the outcome (p > .05).

The fifth linear regression examined goal-related personality traits as predictors of days between final chemotherapy regimen start and death (Table A25). None of the personality traits were significant predictors. However, hope and goal disengagement trended toward significance (β = -.33, t (67) = -1.90, p = .062 and β = -.27, t (67) = -1.88, p = .065, respectively). Control variables were not significantly related to the outcome (p > .05).

DISCUSSION

The goal of this study was to examine EOL clinical encounters (i.e., patient-reported and EMR documented EOL conversations with a physician) and goal-related personality traits (i.e., hope, optimism, goal disengagement, and goal reengagement) as predictors of treatment intensity near EOL in advanced cancer patients. I hypothesized that both patient-reported EOL clinical encounters and the documentation of EOL discussions in the EMR would predict less intensive treatment. I also hypothesized that greater goal disengagement and reengagement would predict less intensive treatment, while greater hope and optimism would predict more intensive treatment. The hypotheses were generally not supported.

Methodological concerns may account for the undetected relationship between patient personality or EOL conversations on the one hand, and EOL treatment intensity on the other. Null results in the majority of the analyses may be a result of lack of power due to the small sample size and relatively high number of predictors. Uneven distributions in dichotomous predictor variables also make it difficult to detect signal (Aguinis, Beaty, Boik, & Pierce, 2005; Shieh, 2009). For example, patient reported EOL clinical encounters had an uneven distribution between those who reported having a clinical encounter (n = 6) and those who did not (n = 63). The same is true for EMR documented EOL clinical encounters. Because of the uneven frequency split in the EOL

clinical encounter variables, it is difficult to interpret the results in the analyses examining them as predictors (Aguinis, Beaty, Boik, & Pierce, 2005; Shieh, 2009).

The analyses examining EMR documented EOL clinical encounters are further complicated by possible reverse causality. The EMR was searched from diagnosis of advanced cancer till death for evidence of EOL conversations between physicians and patients. Patients who are closer to death may be more likely to discuss EOL with their physician. It is thus likely that EMR document EOL conversations occurred following or in conjunction with intensive treatment near EOL. Therefore, the method by which EMR documented EOL clinical encounters were collected resulted in this variable being uninterpretable as a predictor of EOL treatment intensity.

The relationship between performance status and intensive treatment is also difficult to interpret. Performance status was significantly and positively related to overall treatment intensity and use of emergent care within 30 days of death in analyses examining EOL clinical encounters as predictors (p = .049 and p = .027, respectively). Patients with poorer functionality (i.e., higher ECOG rating) received more intensive treatment. Performance status was not a significant predictor of treatment intensity or emergent care use near EOL in analyses examining goal-related personality traits. However, performance status trended toward significance in both analyses (p = .086 and p = .062, respectively). The relationship of performance status with treatment intensity and emergent care in both sets of analyses (i.e., with EOL clinical encounters and goal-related personality traits as predictors) suggests patients who are in poorer health receive more intensive treatment and use emergent care close to death. It is difficult to determine if poorer health reflected by performance status and use of emergent care is the result of

side effects of the treatments being received or an indicator of disease severity independent of treatment.

The analyses may have been further complicated by unavoidable measurement error. Medical record information is often incomplete and many of the treatment variables examined are low frequency events (Sikorskii et al., 2012). It was unclear if the absence of documentation in the EMR represents a true nonexistence of an event or the event simply not being recorded. In this study missing data was coded such that the absence of documentation indicated an event had not occurred. To illustrate, a participant may have attended an ER or hospital during their last 30 days of life that was not connected to the Careweb and INPC systems. In cases like this, emergent care near EOL would have not been detected and would have been coded to indicate that the participant did not receive emergent care near EOL. Misclassified events such as these may result in either overestimating or underestimating the strength of the relationship between predictor and outcome variables, increasing the likelihood of either type 1 and type 2 errors (Gill, Laporte, & Coyte, 2013; Preston et al., 2013).

The problems of missing event data and small sample size are particularly evident in examining hospice enrollment. The detection of hospice enrollment in this study depended on notations in the medical record. Many medical records failed to record hospice enrollment or the decision to forgo enrollment which left a large portion of cases listed as unknown. Beyond small sample size, the large portion of unknown cases for hospice enrollment likely resulted in an incorrect estimation of overall use of hospice in this sample.

Power may have been further limited by restriction of range in continuous variables (Kazdin, 1998). The measures of hope, optimism, and goal flexibility have not been validated in advanced lung and GI cancer patients. Because cancer patients are encouraged to maintain positive attitudes in the face of their disease, these measures may pull for specific patterns of responding (Breetvelt & Van Dam, 1991; O'Leary, Diller, & Recklitis, 2007; Sulmasy et al., 2010). Therefore, responses on the personality measures may not reflect true levels of hope, optimism, and goal flexibility across the sample. Further, outliers were Winsorized and this brought skew and kurtosis values within acceptable limits. However, Winsorizing likely restricted the range of continuous variables such that the ability to detect significance in relatinships between predictor and control variables was reduced (Duan, 1999; Ghosh & Vogt, 2012). This may have resulted in higher type 2 error rates. Other data transformation methods, such as logarithmic transformation, may have preserved more power for analysis (Duan, 1999; Ghosh & Vogt, 2012).

Theoretical Explanations

The above mentioned power limitations should be considered when interpreting the results of the analyses presented below. Documented and patient-reported EOL clinical encounters did not predict use of intensive treatment in this study. The relationship between documented EOL clinical encounters and intensity of treatment may be complicated because as patients spend more time in the hospital, an emergent care setting, or pursuing survival-focused treatment they may be more likely to discuss EOL care with their physician. Patient-reported EOL conversations were timeline dependent

because patients were asked about these encounters on the self-report survey. Documented EOL clinical encounters were not restricted in this way, so that at any point after consent doctors may have had such conversations with their patients and documented it. Hence, there was a relatively high rate of EMR documented EOL conversations compared to patient-reported EOL conversations. The higher rate of EMR documented EOL conversations does not necessarily imply these discussions were early or timely. Further, the uneven frequency distribution for both EMR documented and patient reported EOL clinical encounters makes interpretation of these results difficult. However, methodological issues aside, EOL clinical encounters may not be good predictors of treatment intensity. Doctor-reported EOL conversations have been shown to be a poor indicator of patient prognostic understanding such that documented conversations may not be capturing patients' attitudes and understandings of such encounters (Weeks et al., 2012). For this study, these clinical encounters were not audio recorded so the quality and extent of these discussions is unknown.

Most analyses examining personality traits as predictors of treatment intensity also did not display significance. The lack of significance findings in the relationship between goal-related personality traits and treatment intensity may reflect the true state of nature. While traits such as hope, optimism, and goal flexibility have been shown to relate to treatment outcomes in certain diseases (i.e., breast cancer, heart disease, pain, and diabetes; Madan & Pakenham, 2014; Rasmussen et al., 2006; Ronaldson et al., 2015; Wright et al., 2011), the relationship between these traits and treatment in advanced cancer has not been explored. Advanced cancer patients may represent a special case for the relationship between goal-related personality traits and treatment due to the

complicated nature of the disease (i.e., contemplation of EOL, desire for long-term survival, messages regarding low likelihood of treatment success) such that the power of the EOL situation overwhelms the potential influence of patient personality on treatments received (Siminoff & Fetting, 1991). Siminoff and Fetting (1991) examined treatment decisions in 100 advanced breast cancer patients. They found that the largest predictor of treatment decision was physician recommendation, with 80% of the sample following physician recommendation. They further examined factors in patients who did not follow physician recommendations and found that these patients were given more specific information about benefits of adjuvant therapy, reported higher likelihood and severity of side effects of therapy, rated their physician recommendation as less strong, were more educated, and were more likely to be risk-takers. Patient personality may only influence treatment decisions among those who are given more specific information and less direction from their physicians. Consistent with this, Frongillo, Feibelmann, Belkora, Lee, and Sepucha (2013) examined shared treatment decision-making in breast cancer patients and found that patients who were given a recommendation were less likely to be involved in decision-making. Advanced cancer patients may defer to advice from their doctors such that standard treatment is employed without being influenced by patient personality or EOL goals. In other words, providers may take a more active decision-making role for patients who are facing the EOL.

In addition to physician recommendation, treatment near EOL may be determined by the availability of care. Consistent with this, studies have shown that treatment for advanced cancer varies by geographical region (Connor, Elwert, Spence, & Christakis, 2007; Earle et al., 2004; Gill, Laporte, & Coyte, 2013; Lavergne, Johnston, Gao,

Dummer, & Rheaume, 2011; Mettlin, Murphy, Cunningham, & Menck, 1997; Sateren et al., 2002). This suggests that EOL treatment for advanced cancer, such as hospice utilization and intensive use of chemotherapy, is largely determined by availability and salience. Scibetta and colleagues (2015) examined utilization of palliative care in 922 deceased advanced cancer patients. They found that only 32.2% of the sample received a palliative care consultation. Of these patients, 31.5% received an early referral and 68.5% received a referral in the last months of life. Physician recommendation may reflect treatment availability and salience such that only certain treatment options are presented to patients. Treatments may be selected according to standards of care in a region and without regard to patients' EOL goals.

Despite the predominance of null findings there were some notable trends in the relationships between patient personality traits (i.e., goal reengagement, optimism, and hope) and treatment intensity. Possible explanations of these trends are presented.

In advanced cancer populations, greater goal flexibility is associated with less cancer-related distress (Lam et al., 2015; Thompson, Stanton, & Bower, 2013). Goal flexibility has not been explored in connection with treatment intensity in advanced cancer. I expected patients higher in goal reengagement to be less likely to receive intensive treatment near the EOL. However, greater goal reengagement predicted more days spent in inpatient setting in the last 30 days of life (Table A21), indicating more intensive treatment. Goal reengagement also approached significance in predicting more inpatient admissions in the final 30 days of life. This may be explained by greater goal reengagement allowing patients to reengage with cure goals despite messages that cure is not achievable (i.e., prognostic conversations with doctors and worsening health).

In contrast, goal disengagement had a negligible effect size in almost all analyses, suggesting that dispositional goal disengagement capacities may not apply to EOL situations. Support for this hypothesis is found in Thompson and colleagues' (2013) research on situational and dispositional goal adjustment in advanced breast cancer patients. They found dispositional and situational goal disengagement to be unrelated and suggested that dispositional goal adjustment may not reflect behavior in cases where the unattainable goal is of high value (i.e., life prolongation) and reengagement in alternative goals is difficult (i.e., due to worsening QOL or limited alternatives presented by physicians). Survival may be of uniquely high value, so that patients are unable to disengage from cure goals with the ease they disengage from less valuable goals.

Optimism also showed notable trends in predicting treatment intensity near EOL. It had a notable effect size and trended toward significance in predicting days spent in an inpatient setting in the last 30 days of life (β = -.31, t (69) = -1.99, p = .051; Table A18), indicating patients higher in optimism received less intensive treatment. Although this relationship was not significant, given the present study's limited sample size, it is worth noting as it suggests this variable may be related to treatment intensity. This is counter to the hypothesized relationship, in which optimism was expected to predict greater treatment intensity near EOL. Patients who are more optimistic may be less likely to pursue cure or life prolongation through intensive treatment near EOL. Consistent with this, research has shown that optimists disengage from impossible tasks faster than pessimists when alternatives are available (Aspinwall & Richter, 1999). Therefore, optimistic patients may more readily accept a life-limiting diagnosis, provided they can focus on alternative treatment goals such as symptom management or QOL.

Hope showed significant and notable trends in predicting treatment intensity. I predicted patients who are high in hope would be more likely to persist in survival-focused treatment, and thus have more intensive treatment. Hope predicted days between final chemotherapy administration and death, indicating patients with greater hope received more intensive treatment (β = -.41, t (66) = -2.31, p = .025; Table A24). Hope also had a notable effect size and trended toward significance in predicting time between final chemotherapy regimen start and death, also indicating more intensive treatment (β = -.33, t (66) = -1.90, p = .062; Table A25). Hope may function differently than optimism in the context of EOL because of its focus on the self as an agent of change. Hope comprises the ability to identify pathways toward a goal and the agency to use those pathways (Snyder, 2002). More hopeful patients may be more willing to accept the low likelihood of successful treatment that is typical in advanced lung and GI cancer, such that they pursue survival-focused treatment despite worsening health. If the results reflect a true relationship, it supports the hypothesis that hope may be maladaptive in advanced cancer patients without the option of curative treatment. Because hope is generally associated with better treatment outcomes, these findings are especially interesting. Aspinwall and Leaf (2002) criticized Snyder's hope theory and its failure to explain how hope may impact behavior when goals are unattainable and there are no alternate solutions. The possible maladaptive role of hope in advanced cancer patients merits further examination.

In the analyses examining EOL clinical encounters as predictors, gender had a significant relationships with days spent in an inpatient setting the last 30 days of life (β = -.25, t (69) = -2.04, p = .045; Table A13). Women spent an average of 1.90 more days

inpatient compared to men. Gender trended toward significance in predicting inpatient admissions in the last 30 days of life; also indicating women received more intensive treatment, (β = -.25, t (69) = -1.94, p = .057; Table A14). This is counter to previous literature showing men are less likely to utilize hospice and receive more intensive treatment near EOL than women (Connor et al., 2007; Miesfeldt, Murray, Lucas, Chang, Goodman, & Morden, 2012; Sharma, Prigerson, Penedo, & Maciejewski, 2015). Gender showed no relationship in analyses using personality traits as predictors of inpatient days or admissions. These results may represent a true relationship between gender and treatment intensity that was observable in a simplified model or may represent unreliable findings due to methodological issues.

Conclusion

In summary, most planned analyses did not display a relationship between EOL clinical encounters and treatment intensity or between personality traits and treatment intensity. Interpretation of the results is complicated by reduced power due to sample size, measurement error, and restriction of range in both dichotomous and continuous variables. The results of all analyses should be viewed with reduced power in mind. Because of the small sample size and uneven frequency distributions in the predictor variables, it is particularly difficult to interpret the relationship between EOL clinical encounter variables and treatment intensity.

However, there was some evidence of a relationship between patient personality and treatment intensity. Greater goal reengagement predicted more inpatient days in an emergent care setting in the last 30 days of life, indicating more intensive treatment. This

is counter to the hypothesized relationship. I theorize that greater goal reengagement capacities may allow patients to reengage with life-prolongation and cure goals despite worsening health. However, because goal flexibility has not been explored in the context of intensive EOL treatment for advanced cancer it is difficult to make conclusions about this relationship. The relationship between goal flexibility and EOL treatment in advanced cancer should be explored further.

Optimism also showed a notable effect size in predicting inpatient days; however the relationship was not significant. Great optimism was associated with fewer inpatient days near EOL, indicating less intensive treatment. This is also counter to the hypothesized relationship. I theorize that optimists may be more able to disengage from cure goals and engage in symptom management goals that optimize QOL. Because optimists endorse the idea that good, as opposed to bad things will happen in the future (Scheier & Carver, 1985), they may be more able to accept a life-limiting diagnosis with the expectation that they and their family will be alright whatever the outcome. The relationship between optimism and EOL treatment in advanced cancer also warrants further study.

Finally, greater hope predicted fewer days between final chemotherapy administration and death. Hope also had a notable effect size in an analysis examining days between final chemotherapy regimen start and death. This suggests a positive relationship between hope and treatment intensity near EOL. This relationship confirms the hypothesis that hope would predict more intensive treatment. How hope drives goal-directed behavior when goal achievement is impossible has not been well explained by SRT (Aspinwall & Leaf, 2002). Hope may be maladaptive in situations where goals are

of high value but expectancy of goal achievement is low. Because hope is largely considered adaptive in the context of cancer and cancer treatment, these findings have important implications. Patients high in trait hope appear to be more likely to pursue survival focused treatment even when expectancy of success is low. This knowledge may impact how physicians relate prognostic information to patients.

As this study was exploratory in nature, it is worth noting the significant and trending relationships between goal-related personality traits and treatment intensity despite analyses being underpowered. Hope, optimism, and goal flexibility have not previously been examined as predictors of EOL treatment intensity in advanced cancer. Further research examining the relationship between personality traits and treatment intensity is warranted as knowledge of how goal-related personality traits impact treatment intensity near EOL may help physicians to effectively communicate prognostic and treatment information to their patients.

Limitations

There are several limitations worth noting. The small sample size limited the power of the analyses. However, the methods and analysis employed may still prove fruitful as this study is exploratory in nature and aims to detect trends in treatment choice in advanced cancer patients.

The content of prognostic conversations between physicians and patients was not recorded, such that the extent and accuracy of the communicated prognostic information is not known.

The external validity of this study may be affected by volunteer bias. Volunteers have shown differences in impulsivity and willingness to disclose when compared to non-volunteers (Gustavsson, Asberg, & Schalling, 1997; Hood & Back, 1971). Those who participate may differ significantly from those who refused participation such that findings from this study may not generalize to the larger advanced cancer population. In this study, consenters were younger than refusers. Therefore, it is likely that this study, similar to other studies in cancer populations, may have been subject to "healthy volunteer bias." Patients who were in better general health may have been more willing to participate than patients who were more ill, biasing the sample to participants with lower symptom burden and longer survival time (Gill, Laporte, & Coyte, 2013; Preston et al., 2013).

Medical record information is incomplete and may be inaccurate. This is often a problem encountered in studies that require medical record review (Sikorskii et al., 2012). Missing and unknown information is a common problem in research examining health care information in cancer patients, particularly among those approaching the EOL (Gill, Laporte, & Coyte, 2013; Preston et al., 2013). The issue of missing and unknown event data was particularly evident in examining hospice enrollment in this sample, as hospice enrollment was unknown for a large portion of the sample. Unknown event data can result in under- or overestimating event occurrence and loss of power in statistical analysis (Gill, Laporte, & Coyte, 2013; Prestion et al., 2013). However, the methods of data collection and variables examined in the study have been shown to be good indicators of treatment intensity in this population (Earle et al., 2003).

Self-report measures may be affected by social desirability (Podsakoff et al., 2003). Research has shown that cancer patients may be at particular risk for biased reporting on self-report measures (Breetvelt & Van Dam, 1991; O'Leary et al., 2007). For example, childhood cancer survivors display a tendency to underreport QOL issues and emotional difficulties compared to healthy controls (O'leary et al., 2007). The culture associated with cancer emphasizes hope and staying positive (Sulmasy et al., 2010), such that participants may feel pressure give the "right" answer on measures of hope, optimism, and goal flexibility. This would bias the assessment of these variables, restrict range, and thereby reduce the association between goal-related personality traits and treatment intensity.

Finally, the external validity of the study is limited by sample demographics, types of cancer studied, and the recruitment location. Subjects recruited from a tertiary cancer center may differ from patients treated in other settings by their treatment goals and care received (Haas et al., 2007; Lavergne, Johnston, Gao, Dummer, & Rheaume, 2011; Sateren et al., 2002). These issues may limit the generalizability of these findings to the broader advanced cancer patient population.

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APPENDICES

Appendix A: Tables

Table A1. Electronic Medical Record Coding

Information regarding various indicators of intensive treatment were noted in multiple sections of the medical record, including: 1) scheduled clinic visit notes; 2) social worker notes; 3) chaplain notes; 4) ICU/ER admission notes; 5) ICU/ER discharge notes; 6) nursing encounter notes; 7) intravenous drug administration records; 8) uploaded legal documents; 9) uploaded doctors' correspondence; 10) uploaded correspondence between health care sites; and 11) patient correspondence.

Variable	Electronic source document	Example
Enrollment in hospice	Scheduled clinic visit notes (included in disease history section and/or current treatment plan section), social worker notes, chaplain notes, ICU/ER admission/discharge notes, nursing encounter notes, uploaded legal documents, uploaded doctors' correspondence, uploaded correspondence between health care sites, and patient correspondence.	Physician note: "I discussed with her options including best supportive care with or without hospice services…"
Prognostic conversation	Scheduled clinic visit notes (included in disease history section and/or current treatment plan section)	Physician note: "The patient was advised regarding the risk and benefits of therapy and the side effects. In addition, I did discuss with the patient and her family her prognosis. Unfortunately, she has extensive extra-pulmonary small cell carcinoma for which therapy can prolong life and is palliative, however, is not curative. She took this information extremely well, and has a clear understanding about the current situation. We will plan on seeing her back in about 3 weeks' time or sooner should she have any problems."

Table A1. continued

Performance status	**Scheduled clinic visit notes (included in disease history section and/or current treatment plan section)**	**Physician note: "ECOG performances status is 1."**
Chemotherapy administration	Scheduled clinic visit notes (included in disease history section and/or current treatment plan section), intravenous drug administration records, uploaded doctors' correspondence, and uploaded correspondence between health care sites	Physician note: "The patient received four cycles of carboplatin and gemcitabine with an excellent subjective and objective response."
ICU/ER	ICU/ER admission/discharge notes, uploaded correspondence between health care sites, and patient correspondence	Length of stay noted on discharge form. e.g., DATE OF ADMISSION: 07/08/2010 DATE OF DISCHARGE: 07/14/2010
Hospitalization	Scheduled clinic visit notes (included in disease history section and/or current treatment plan section), ICU/ER admission/discharge notes, uploaded correspondence between health care sites, and patient correspondence	Length of stay noted on discharge form. e.g., DATE OF ADMISSION: 09/08/2010 DATE OF DISCHARGE: 09/12/2010

Table A2. Demographics

Variable		
	M(SD)	
Age		60.3(11.9)
	N	%
Gender		
Male	38	50.0
Female	38	50.0
Cancer type		
Lung	34	44.7
GI	42	55.3
Race		
Caucasian	71	93.4
African American	3	3.9
Missing	2	2.6
Education		
Some high school or less	5	6.6
High school graduate	24	31.6
Some college	12	15.8
College graduate	11	14.5
Some graduate or professional school	7	9.2
Graduate or professional school degree	13	17.1
Missing	4	5.3
Marital status		
Single never married	3	3.9
Married or partnered	53	69.7
Separated	3	3.9
Divorced	7	9.2
Widowed	6	7.9
Missing	4	5.3
Insurance type		
None	2	2.6
Fee-for-service	2	2.6
Managed care	26	34.2
Medicare	35	46.1
Medicaid	5	6.6
Missing	6	7.9
Performance status		
0	25	32.9
1	39	51.3
2	11	14.5
3	1	1.3

Table A3. Characteristics of Dichotomous Predictor and Outcome Variables

Dichotomous Variable	Yes (N)	%
EMR documented EOL clinical encounter	68	89.50
Patient-reported EOL clinical encounter	6	8.50
Intensive treatment	29	38.20
Chemotherapy within 30 days of death or new chemotherapy regimen start within 60 days of death	14	18.40
Emergent care use within 30 days of death	23	30.30

Table A4. Characteristics of Continuous Predictor and Outcome Variables

Continuous Variable	Mean	SD	Skew	Kurtosis
Hope	51.76	7.46	-.69	.62
Optimism	17.03	3.49	-.20	.21
Goal disengagement	10.52	2.68	-.61	-.32
Goal reengagement	21.29	4.79	-.14	-.46
Day spent in the ER/ICU or hospitalized within 30 days of death	2.39	4.22	2.78	9.64
Admissions to the ER/ICU or hospital within 30 days of death	.62	.78	1.14	.73
Days between hospice admission and death	42.20	70.25	3.20	11.72
Days between last chemotherapy administration and death	149.79	209.76	3.19	11.78
Days between final chemotherapy regimen start and death	240.36	231.25	2.47	7.56

Table A5. Correlations

Zero order correlations between predictor and control variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Hope		.60**	-.49**	.56**	.01	.08	-.03	-.01	-.06	-.41**
2. Optimism			-.38**	-.50	.04	.19	.04	.01	-.12	-.39**
3. Goal disengagement				-.47**	.05	-.10	.20	.07	.09	.17
4. Goal reengagement					.03	.06	-.10	-.18	-.04	-.13
5. EMR documented EOL conversation						.10	.22	-.26*	.11	-.10
6. Patient-reported EOL goals conversation							.08	-.10	.80	-.01
7. Age								-.12	.27*	-.06
8. Gender									-.04	.02
9. Performance status										.16
10. Distress										

Note. *$p < .05$. **$p < .01$.

Table A6. Research Question 1, Logistic Regression Analyses

Analyses	Predictor Variables	Controls	Outcome Variable
1st logistic regression (Table 10)	EMR documented EOL conversation; Patient-reported EOL goals conversation	Age, Gender; Performance status; Distress	Use of intensive treatment
2nd logistic regression (Table A11)	EMR documented EOL conversation; Patient-reported EOL goals conversation	Age; Gender; Performance status; Distress	Chemotherapy use near EOL
3rd logistic regression (Table A12)	EMR documented EOL conversation; Patient-reported EOL goals conversation	Age; Gender; Performance status; Distress	Emergent care use within 30 days of death

Table A7. Research Question 1, Linear Regression Analyses

Analyses	Predictor Variables	Controls	Outcome Variable
1st linear regression (Table A13)	EMR documented EOL conversation; Patient-reported EOL goals conversation	Age; Gender; Performance status; Distress	Total inpatient days within 30 days of death
2nd linear regression (Table A14)	EMR documented EOL conversation; Patient-reported EOL goals conversation	Age; Gender; Performance status; Distress	Total inpatient admissions within 30 days of death
3rd linear regression (Table A15)	EMR documented EOL conversation; Patient-reported EOL goals conversation	Age; Gender; Performance status; Distress	Days on hospice
4th linear regression (Table A16)	EMR documented EOL conversation; Patient-reported EOL goals conversation	Age; Gender; Performance status; Distress	Days between final chemotherapy administration and death
5th linear regression (Table A17)	EMR documented EOL conversation; Patient-reported EOL goals conversation	Age; Gender; Performance status; Distress	Days between final chemotherapy regimen start and death

Table A8. Research Question 2, Logistic Regression Analyses

Analyses	Predictor Variables	Controls	Outcome Variable
1st logistic regression (Table A18)	Hope; Optimism; Goal disengagement; Goal reengagement	Age; Gender; Performance status; Distress	Use of intensive treatment
2nd logistic regression (Table A19)	Hope; Optimism; Goal disengagement; Goal reengagement	Age; Gender; Performance status; Distress	Chemotherapy use near EOL
3rd logistic regression (Table A20)	Hope; Optimism; Goal disengagement; Goal reengagement	Age; Gender; Performance status; Distress	Emergent care use within 30 days of death

Table A9. Research Question 2, Linear Regression Analyses

Analyses	Predictor Variables	Controls	Outcome Variable
1st linear regression (Table A21)	Hope; Optimism; Goal disengagement; Goal reengagement	Age; Gender; Performance status, Distress	Total inpatient days within 30 days of death
2nd linear regression (Table A22)	Hope; Optimism; Goal disengagement, Goal reengagement	Age; Gender; Performance status; Distress	Total inpatient admissions within 30 days of death
3rd linear regression (Table A23)	Hope; Optimism; Goal disengagement; Goal reengagement	Age; Gender; Performance status; Distress	Days on hospice
4th linear regression (Table A24)	Hope; Optimism; Goal disengagement; Goal reengagement	Age; Gender; Performance status; Distress	Days between final chemotherapy administration and death
5th linear regression (Table A25)	Hope; Optimism; Goal disengagement; Goal reengagement	Age; Gender; Performance status; Distress	Days between final chemotherapy regimen start and death

Table A10. Research Question 1: Summary of Hierarchical Logistic Regression Analysis for EOL Clinical Encounters Predicting Use of Intensive Treatment near End of Life (*N* = 69)

	Variable	B	S.E.	O.R.	95% CI	*p*
Step 1						
	Age	-0.02	0.02	0.98	0.94-1.03	0.479
	Gender	-0.90	0.55	0.40	0.14-1.20	0.102
	Performance status	**0.89**	**0.45**	**2.43**	**1.00-5.90**	**0.049**
	Distress	-0.02	0.05	0.98	0.90-1.07	0.660
Step 2						
	EMR documented EOL conversation [A]	-0.45	0.97	1.04	0.15-7.00	0.970
	Patient-reported EOL goals conversation [B]	0.70	0.93	0.64	0.10-3.93	0.625

Note: For step 2, Nagelkerke R^2 = .153; model chi square = 8.230, $p > .05$, df = 6. Hosmer and Lemeshow (H-L) goodness of fit statistic chi square = 12.980, $p > .05$, df = 8. Gender is coded so that 0 = female and 1 = male. The dependent variable is coded so that 0 = no intensive treatment indicator and 1 = presence of an intensive treatment indicator. [A] n = 63. [B] n = 6. Bolded line indicates $p < .05$.

Table A11. Research Question 1: Summary of Hierarchical Logistic Regression Analysis for EOL Clinical Encounters Predicting Chemotherapy Use near End of Life (*N* = 69)

Variable	B	S.E.	O.R.	95% CI	*p*
Step 1					
Age	-0.01	0.03	0.99	0.94-1.05	0.680
Gender	-0.46	0.66	0.63	0.17-2.32	0.491
Performance status	0.33	0.48	1.39	0.54-3.56	0.497
Distress	-0.04	0.06	0.97	0.87-1.08	0.516
Step 2					
EMR documented EOL conversation [A]	0.01	1.21	1.01	0.10-10.70	0.996
Patient-reported EOL goals conversation [B]	0.78	0.95	2.19	0.34-13.98	0.408

Note: For step 2, Nagelkerke R^2 = .050; model chi square = 2.182, $p > .05$, df = 6. H-L goodness of fit statistic chi square = 8.809, $p > .05$, df = 8. Gender is coded so that 0 = female and 1 = male. The dependent variable is coded so that 0 = receiving no chemotherapy within these periods and 1 = receiving chemotherapy within these periods. [A] n = 63. [B] n = 6.

Table A12. Research Question 1: Summary of Hierarchical Logistic Regression Analysis for EOL Clinical Encounters Predicting Emergent Care Use within 30 Days of Death (*N* = 69)

	Variable	B	S.E.	O.R.	95% CI	*p*
Step 1						
	Age	-0.02	0.03	0.98	0.93-1.03	0.375
	Gender	-1.01	0.61	0.36	0.11-1.20	0.097
	Performance status	**1.12**	**0.50**	**3.06**	**1.14-8.20**	**0.027**
	Distress	0.04	0.05	1.04	0.94-1.15	0.497
Step 2						
	EMR documented EOL conversation [A]	0.84	1.25	2.30	0.20-26.73	0.504
	Patient-reported EOL goals conversation [B]	-1.13	1.18	0.32	0.03-3.26	0.339

Note: For step 2, Nagelkerke R^2 = .242; model chi square = 12.779, $p < .05$, df = 6. H-L goodness of fit statistic chi square = 6.683, $p > .05$, df = 8. Gender is coded so that 0 = female and 1 = male. The dependent variable is coded so that 0 = no emergent care use and 1 = emergent care use. [A] n = 63. [B] n = 6. Bolded line indicates $p < .05$.

Table A13. Research Question 1: Summary of Hierarchical Linear Regression Analysis for EOL Clinical Encounters Predicting Total Days Inpatient in the ICU/ER and/or Hospitalized within 30 Days of Death (N = 69)

	Variable	B	S.E.	β	*t*	*p*
Step 1						
	Age	-0.03	0.04	-0.10	-0.75	0.455
	Gender	**-1.90**	**0.93**	**-0.25**	**-2.04**	**0.045**
	Performance status	0.78	0.70	0.14	1.11	0.270
	Distress	-0.04	0.08	-0.06	-0.52	0.603
Step 2						
	EMR documented EOL conversation [A]	0.25	1.57	0.02	0.16	0.876
	Patient-reported EOL goals conversation [B]	-2.41	1.60	-0.18	-1.50	0.139

Note: R^2 = .086 for step 1; ΔR^2 = .032 for step 2 (p > .05). Gender is coded so that 0 = female and 1 = male.

[A] n = 63. [B] n = 6. Bolded line indicates p < .05.

Table A14. Research Question 1: Summary of Hierarchical Linear Regression Analysis for EMR Documented EOL Clinical Encounters Predicting Inpatient Admissions within 30 Days of Death (N = 69)

Variable	B	S.E.	β	*t*	*p*
Step 1					
Age	-0.01	0.01	-0.08	-0.58	0.566
Gender	-0.38	0.20	-0.25	-1.94	0.057
Performance status	0.15	0.14	0.13	1.03	0.309
Distress	0.00	0.02	-0.02	-0.18	0.856
Step 2					
EMR documented EOL conversation [A]	-0.15	0.33	-0.06	-0.43	0.659
Patient-reported EOL goals conversation [B]	-0.22	0.65	-0.08	-0.64	0.523

Note: R^2 = .065 for step 1; ΔR^2 = .010 for step 2 (p > .05). Gender is coded so that 0 = female and 1 = male.

[A] n = 63. [B] n = 6.

Table A15. Research Question 1: Summary of Hierarchical Linear Regression Analysis for EOL Clinical Encounters Predicting Days on Hospice (N = 42)

Variable	B	S.E.	β	*t*	*p*
Step 1					
Age	0.50	0.85	0.10	0.59	0.560
Gender	25.80	19.52	0.21	1.32	0.195
Performance status	17.68	14.20	0.20	1.25	0.222
Distress	2.03	1.47	0.21	1.38	0.178
Step 2					
EMR documented EOL conversation [A]	38.56	61.38	0.10	0.63	0.534
Patient-reported EOL goals conversation [B]	53.50	31.33	0.26	1.71	0.097

Note: R^2 = .104 for step 1; ΔR^2 = .037 for step 2 (p > .05). Gender is coded so that 0 = female and 1 = male.

[A] n = 41. [B] n = 4.

Table A16. Research Question 1: Summary of Hierarchical Linear Regression Analysis for EMR Documented EOL Clinical Encounters Predicting Days Between Final Chemotherapy Administration and Death (N = 66)

Variable	B	S.E.	β	*t*	*p*
Step 1					
Age	0.72	1.79	0.05	0.41	0.687
Gender	-2.20	41.59	-0.01	-0.05	0.958
Performance status	-36.26	31.86	-0.16	-1.14	0.260
Distress	2.91	3.51	0.11	0.83	0.410
Step 2					
EMR documented EOL conversation [A]	76.30	74.07	0.14	1.03	0.307
Patient-reported EOL goals conversation [B]	-71.87	71.02	-0.13	-1.01	0.316

Note: R^2 = .023 for step 1; ΔR^2 = .031 for step 2 (p > .05). Gender is coded so that 0 = female and 1 = male.

[A] n = 66. [B] n = 6.

Table A17. Research Question 1: Summary of Hierarchical Linear Regression Analysis for EOL Clinical Encounters Predicting Days between Final Chemotherapy Regimen Start and Death (N = 66)

Variable	B	S.E.	β	*t*	*p*
Step 1					
Age	0.18	2.11	0.01	0.09	0.931
Gender	-5.89	48.90	-0.02	-0.12	0.905
Performance status	-40.79	37.47	-0.15	-1.09	0.281
Distress	-0.99	4.12	-0.03	-0.24	0.811
Step 2					
EMR documented EOL conversation [A]	27.11	87.09	0.04	0.31	0.757
Patient-reported EOL goals conversation [B]	-112.17	83.50	-0.17	-1.34	0.184

Note: R^2 = .027 for step 1; ΔR^2 = .030 for step 2 (p > .05). Gender is coded so that 0 = female and 1 = male.

[A] n = 66. [B] n = 6.

Table A18. Research Question 2: Summary of Hierarchical Logistic Regression Analysis for Personality Variables Predicting Use of Intensive Treatment Near EOL (N = 70)

Variable	B	S.E.	O.R.	95% C.I.	*p*
Step 1					
Age	-0.01	0.03	1.00	0.94-1.05	0.839
Gender	-0.80	0.57	0.45	0.15-1.37	0.160
Performance Status	0.79	0.46	2.20	0.90-5.40	0.086
Distress	-0.02	0.06	0.98	0.88-1.10	0.723
Step 2					
Hope	0.03	0.06	1.03	0.91-1.15	0.665
Optimism	-0.09	0.11	0.92	0.74-1.13	0.407
Goal disengagement	-0.10	0.12	0.90	0.71-1.15	0.400
Goal reengagement	0.12	0.08	1.13	0.97-1.32	0.118

Note: For step 2, Nagelkerke R^2 = .255; model chi square = 14.474, $p > .05$, df = 8; H-L goodness of fit statistic chi square = 10.114, $p > .05$, df = 8. Gender is coded so that 0 = female and 1 = male. The dependent variable is coded so that 0 = no intensive treatment indicator and 1 = presence of an intensive treatment indicator.

Table A19. Research Question 2: Summary of Hierarchical Logistic Regression Analysis for Personality Variables Predicting Chemotherapy Use near EOL (N = 70)

Variable	B	S.E.	O.R.	95% CI	*p*
Step 1					
Age	-0.01	0.03	0.99	0.93-1.05	0.659
Gender	-0.50	0.67	0.61	0.16-2.27	0.459
Performance Status	0.25	0.48	1.28	0.50-3.28	0.608
Distress	-0.05	0.07	0.95	0.84-1.09	0.476
Step 2					
Hope	0.03	0.07	1.03	0.90-1.17	0.711
Optimism	-0.05	0.12	0.95	0.75-1.20	0.663
Goal disengagement	0.14	0.15	1.15	0.85-1.55	0.365
Goal reengagement	0.09	0.09	1.10	0.92-1.30	0.301

Note: For step 2, Nagelkerke R^2 = .076; model chi square = 3.348, $p > .05$, df = 8; H-L goodness of fit statistic chi square = 8.618, $p > .05$, df = 8. Gender is coded so that 0 = female and 1 = male. The dependent variable is coded so that 0 = receiving no chemotherapy within these periods and 1 = receiving chemotherapy within these periods.

Table A20. Research Question 2: Summary of Hierarchical Logistic Regression Analysis for Personality Variables Predicting Emergent Care Use within 30 Days of Death (*N* = 70)

Variable	B	S.E.	O.R.	95% CI	*p*
Step 1					
Age	-0.01	0.03	0.99	0.94-1.05	0.815
Gender	-0.95	0.64	0.39	0.11-1.36	0.137
Performance Status	0.97	0.52	2.64	0.95-7.28	0.062
Distress	0.03	0.06	1.03	0.91-1.17	0.622
Step 2					
Hope	0.05	0.07	1.05	0.92-1.21	0.447
Optimism	-0.18	0.13	0.84	0.65-1.07	0.149
Goal disengagement	-0.07	0.14	0.93	0.71-1.23	0.621
Goal reengagement	0.16	0.09	1.17	0.98-1.40	0.081

Note: For step 2, Nagelkerke R^2 = .335; model chi square = 18.612, $p < .05$, df = 8; H-L goodness of fit statistic chi square = 5.575, $p > .05$, df = 8. Gender is coded so that 0 = female and 1 = male. The dependent variable is coded so that 0 = no emergent care use and 1 = emergent care use.

Table A21. Research Question 2: Summary of Hierarchical Linear Regression Analysis for Personality Variables Predicting Total Days Inpatient in the ICU/ER and/or Hospitalized within 30 Days of Death (N = 70)

Variable	B	S.E.	β	*t*	*p*
Step 1					
Age	-0.01	0.04	-0.04	-0.33	0.744
Gender	-1.39	0.88	-0.19	-1.58	0.119
Performance status	0.46	0.65	0.09	0.71	0.482
Distress	-0.05	0.08	-0.08	-0.58	0.568
Step 2					
Hope	0.07	0.09	0.14	0.83	0.407
Optimism	-0.33	0.16	-0.31	-1.99	0.051
Goal disengagement	0.02	0.20	0.01	0.10	0.920
Goal reengagement	**0.30**	**0.12**	**0.38**	**2.54**	**0.014**

Note: R^2 = .087 for step 1; ΔR^2 = .134 for step 2 (p = .04). Gender is coded so that 0 = female and 1 = male. Bolded line indicates $p < .05$.

Table A22. Research Question 2: Summary of Hierarchical Linear Regression Analysis for Personality Variables Predicting Inpatient Admissions within 30 Days of Death (*N* = 70)

Variable	B	S.E.	β	*t*	*p*
Step 1					
Age	-0.00	0.01	-0.04	-0.34	0.732
Gender	-0.29	0.19	-0.18	-1.49	0.141
Performance status	0.12	0.14	0.12	0.87	0.389
Distress	0.01	0.02	0.07	0.50	0.616
Step 2					
Hope	0.01	0.02	0.13	0.75	0.455
Optimism	-0.01	0.04	-0.04	-0.28	0.782
Goal disengagement	-0.02	0.04	-0.06	-0.39	0.697
Goal reengagement	0.05	0.03	0.27	1.76	0.083

Note: R^2 = .072 for step 1; ΔR^2 = .120 for step 2 (p > .05). Gender is coded so that 0 = female and 1 = male.

Table A23. Research Question 2: Summary of Hierarchical Linear Regression Analysis for Personality Variables Predicting Days on Hospice (N = 42)

Variable	B	S.E.	β	*t*	*p*
Step 1					
Age	-0.62	1.21	0.10	0.51	0.612
Gender	1.16	27.81	0.02	0.04	0.967
Performance status	21.49	17.83	0.29	1.65	0.108
Distress	0.06	2.43	0.01	0.02	0.981
Step 2					
Hope	-1.45	2.54	-0.15	-0.57	0.571
Optimism	3.67	5.12	0.16	0.71	0.479
Goal disengagement	4.52	6.48	0.15	0.70	0.490
Goal reengagement	-4.63	3.88	-0.28	-1.19	0.241

Note: R^2 = .107 for step 1; ΔR^2 = .110 for step 2 (p > .05). Gender is coded so that 0 = female and 1 = male.

Table A24. Research Question 2: Summary of Hierarchical Linear Regression Analysis for Personality Variables Predicting Days between Final Chemotherapy Administration and Death (N = 67)

Variable	B	S.E.	β	*t*	*p*
Step 1					
Age	0.36	1.75	0.03	0.21	0.836
Gender	-8.79	38.74	-0.03	-0.23	0.821
Performance status	-23.38	29.40	-0.10	-0.80	0.430
Distress	-1.18	3.68	-0.05	-0.32	0.749
Step 2					
Hope	**-8.98**	**3.89**	**-0.41**	**-2.31**	**0.025**
Optimism	6.35	7.23	0.14	0.88	0.384
Goal disengagement	-10.48	8.52	-0.18	-1.23	0.224
Goal reengagement	-7.95	5.33	-0.23	-1.49	0.142

Note: R^2 = .025 for step 1; ΔR^2 = .158 for step 2 (p = .034). Gender is coded so that 0 = female and 1 = male. Bolded line indicates $p < .05$.

Table A25. Research Question 2: Summary of Hierarchical Linear Regression Analysis for Personality Variables Predicting Days between Final Chemotherapy Regimen Start and Death (N = 67)

Variable	B	S.E.	β	*t*	*p*
Step 1					
Age	0.47	2.05	0.03	0.23	0.821
Gender	3.17	45.30	0.01	0.07	0.944
Performance status	-38.72	34.39	-0.15	-1.13	0.265
Distress	-6.50	4.30	-0.21	-1.51	0.137
Step 2					
Hope	-8.65	4.55	-0.33	-1.90	0.062
Optimism	-7.59	8.46	-0.15	-0.90	0.373
Goal disengagement	-18.72	9.97	-0.27	-1.88	0.065
Goal reengagement	-5.32	6.24	-0.13	-0.85	0.397

Note: R^2 = .032 for step 1; ΔR^2 = .165 for step 2 (p = .026). Gender is coded so that 0 = female and 1 = male.

Appendix B: Figures

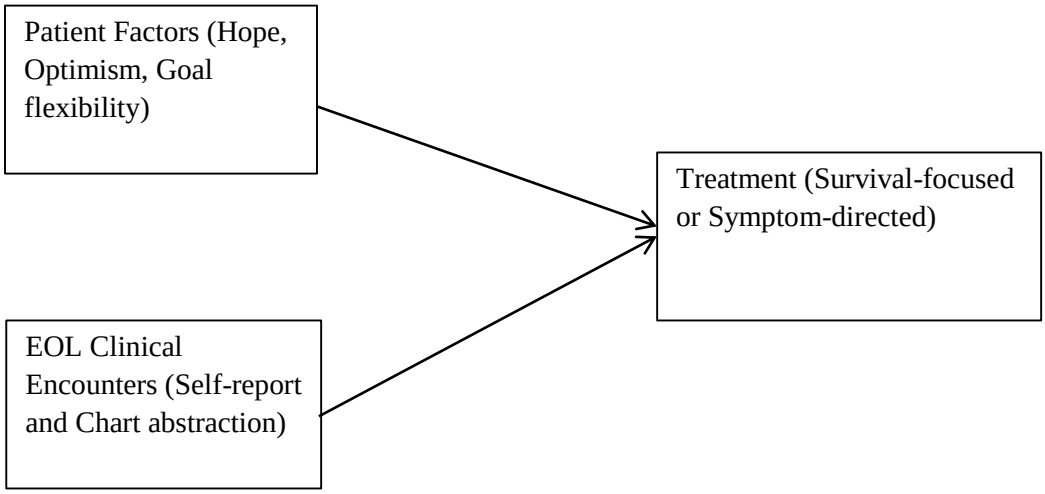

Figure B1. Expected Relationships

Patient factors and EOL clinical encounters may impact treatment decisions at EOL.

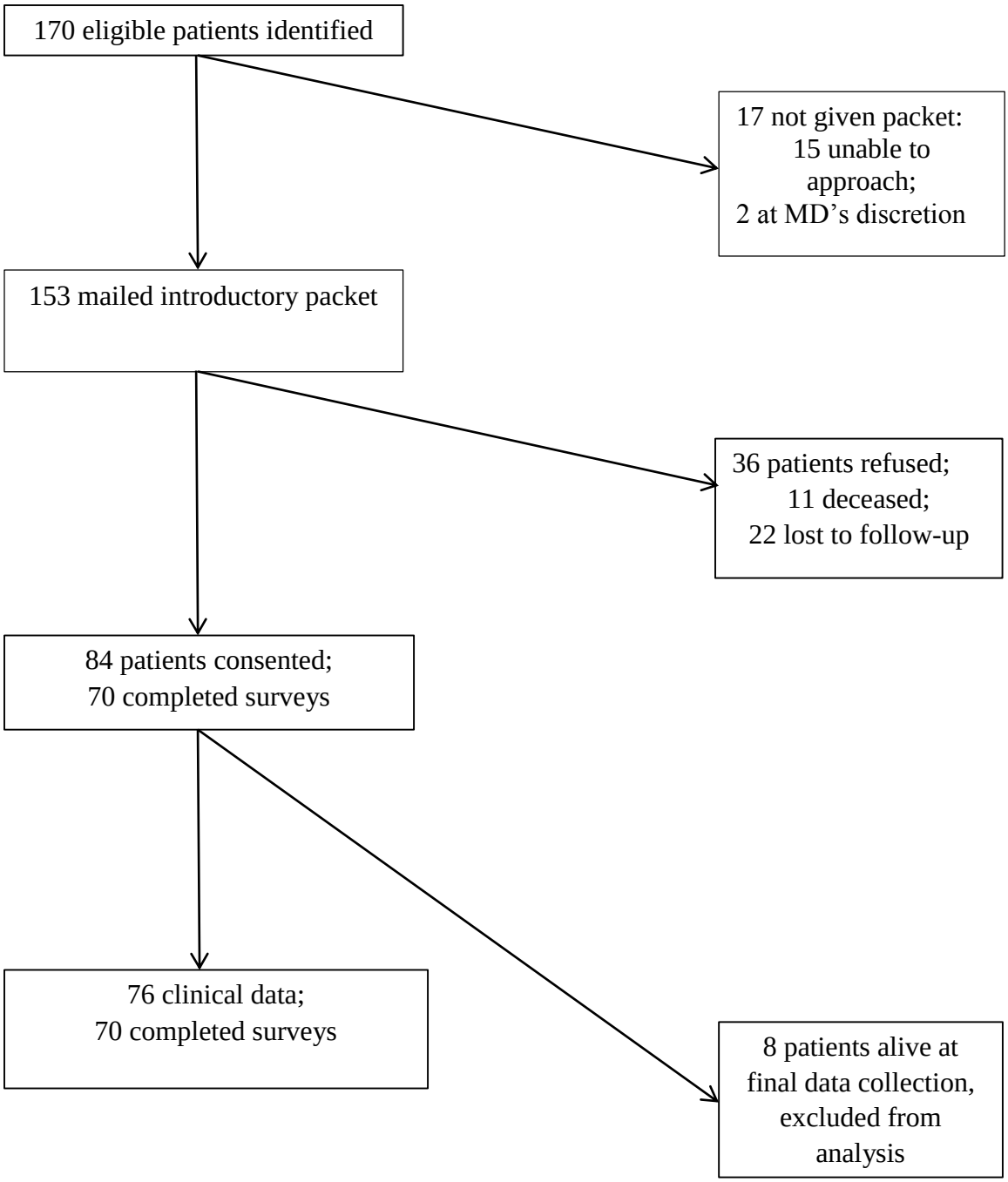

Figure B2. Participant Recruitment

Participant recruitment March 2010-July 2011